ROOT AND TUBER EXPANSION PROGRAMME TECHNOLOGIES AND FARMERS' PRODUCTIVITY IN LAGOS AND OGUN STATES OF NIGERIA

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Abstract: There are several problems responsible for the inability of Nigeria as a nation towards attaining self sufficiency in food production especially in root and tuber crops, one of these problems is the unrealized yield potential that could be achieved through the adoption of improved and recommended technologies. Increase in crop productivity has always remain a concern of both governmental and non-governmental organisations and this is the reason many agricultural technologies have been introduced towards improving the efficiency of crop production systems. Several reasons have however been attributed to the less than desirable performance of these technologies. This study examined the effect of Root and Tuber Expansion Programme (RTEP) technologies on farmers' productivity in Lagos and Ogun States. Multi-stage sampling technique was used to select two hundred farmers from two blocks in each of the states in the study area. Interview schedule was administered on 50 farmers who were randomly selected from each block to make a total of 200. Descriptive and inferential statistics were used to analyse the data collected. The result revealed that 67.3% of the respondents had formal education, which has a great influence on technologies use and 24.6% were below 40 years of age. Majority were married while only 4.5% indicated being widowed, there were more male than female in root and tuber crop production. The chi-square analysis indicated that there was no significant relationship between sex and productivity level of farmers in Lagos state (χ^2 =1.306, P = 0.521), while there was significant relationship between sex and productivity level of farmers in Ogun state (χ^2 =21.335, P = 0.000). The result of the study also revealed a significant relationship between the use of Root and Tuber Expansion Programme technologies and productivity of farmers in Lagos state (ρ = 0.491, P = 0.000) and Ogun state (ρ = 0.575, P = 0.000). The analysis of variance showed a significant difference in the use of technologies between farmers in Lagos and Ogun states as well as in their productivity level. Based on the results of this study, a number of recommendations were made.

Keywords: RTEP, RTEP technologies, Root and tuber crops, Productivity, Nigeria

INTRODUCTION

Over the years, the Nigerian government with support from the Food and Agriculture Organisation (FAO) of the United Nations and other development agencies have made various efforts towards addressing the problems of low productivity and its related elements in many ways. In order to address the problems of agricultural production and recognizing the role of developmental programme in the overall agricultural development of the nation, the Federal Government introduced several programmes aimed at reversing the decline in food and fibre production, one of such programmes is the Root and Tuber Expansion Programme (RTEP). The RTEP was embarked upon in realisation of the important roles of these classes of agricultural produce. The major root and tuber crops, (such as cassava, Irish potatoes. sweet potatoes, and yam) play a significant role in the global food system through their contributions to the energy and nutrition requirements of more than 2 billion people in

developing countries, and this will continue over the next two decades. Root and tuber crops produce are consumed by many of the world's poorest and food-insecure households (Gregory *et. al.* 2000).

RTEP (as a National Agricultural Initiative) is a major key player in the institutional framework for cassava production in Nigeria. The framework includes the National Root Crops Research Institute (NRCRI), Umudike and International Institute for Tropical Agriculture (IITA), Ibadan (Phillip et al 2009). RTEP, funded by a loan from International Fund for Agricultural Development (IFAD), was established mainly for multiplication and distribution of planting materials. RTEP is an IFAD-assisted project with counterpart contributions from federal and participating state governments (including Lagos and Ogun) as well as and the beneficiary community groups. At inception in 2003, RTEP was conceived as a root and tuber multiplication scheme, but later included a post-harvest component as a result of anticipated production expansion. The program was implemented in 27 cassava-producing states and was recently recommended to include processing and marketing components (PRCU 2006).

Low crop productivity and crop failures have continued to persist in the rural areas of Lagos and Ogun States. Inhabitants of these States are faced with exorbitant prices of Agricultural products, in spite of several developmental programmes that abound in the study area. Notwithstanding the availability of agricultural expertise and developmental programmes, majority of members of the farming communities still practise agriculture using the old methods due to spatial and temporal constraints as the technologies and scientific advice do not reach the needy farmers in a timely manner. Couple with this, most of the farmers are illiterate or with little education; there is therefore a wide gap between agricultural technologies generation and use, resulting in backwardness and economic and social stagnation in these farming communities due to low crop yield. RTEP involves the use of improved varieties; pre-release variety, certified seed control, seed quality control, and fabricator database etc. Appropriate use of technologies is needed to ensure environmentally sustainable production practices of a diversified range of high quality root and tuber products for food, feed and industry to help eradicate poverty, ensure access to adequate food and improve incomes.

It is against this background that the study assessed the effect of Root and Tuber Expansion Programme technologies on farmer's productivity. Specifically, the study attempted to: (i) identify the personal characteristics of farmers in the study area; (ii)determine the attitude of farmers towards the technologies of RTEP; (iii) ascertain the benefits derived by farmers from the technologies of RTEP; and (iv) ascertain farmer's constraints with respect to the use of RTEP technologies.

Hypotheses of the study

The hypotheses of the study are: (i) there is no significant relationship between selected personal characteristic of farmer and the productivity levels of the crop; (ii) there is no significant relationship between the use of RTEP technologies and productivity level of farmers; and (iii) there is no significant difference in the productivity level of farmers from Lagos and Ogun States.

METHODOLOGY

The study was conducted in Lagos and Ogun States, in South Western Nigeria. Lagos is the most urbanized state in Nigeria, with a population of 9.11 million inhabitants (NPC 2013). Ogun State is located on longitude 20˚4 East and latitude 4˚40 – 9˚15 North. It has two ecological zones namely, rain forest zone in the southern part and derived savannah in the northern part of the state. The zones are characterized with high elevation exceeding 200meters.Annual rainfall of between 1,000 and 1,800mm from North to South. The vegetation is predominantly rainforest with a population of 3,751,140 inhabitants (National Population Commission, NPC 2006). The main occupation of the inhabitants is agricultural production. The target populations of the study comprised the root and tuber crop farmers in Lagos and Ogun States.

Sampling procedure and sample size

Root and Tuber Expansion Programme cover the three Agricultural Development Programme (ADP) zones in Lagos State (East, West and Far East) and the four ADP zones in Ogun State (Abeokuta, Ilaro, Ijebu-Ode and Ikenne). The two states were purposively selected from the South Western Nigeria because of the high volume of production of root and tuber crops. Multistage sampling procedure was used. First, one zone was purposively selected from each of the states. Second, two blocks were randomly selected from each of the selected zone. Nine cells were picked in Lagos State and eight cells from Ogun State giving a total of seventeen cells. From each of these cells, the number of households was estimated. A systematic sampling method was used to select households. Serial numbers were assigned to each household and every third household was selected. In all, a total of 100 respondents were sampled in each of Lagos and Ogun States, however only 199 farmers responded fully to all the items in the schedule. The

respondents comprised of farmers using Root and Tuber Expansion Programme Technologies. The data for the study were collected through the use of survey techniques to obtain information from root and tuber crop farmers. This was to ensure personal contact with the farmers. Since some of the farmers have little or no education, the items in the interview guide were verbally translated into their local languages but their responses were recorded in English. Data collected were subjected to both descriptive and inferential statistics.

RESULTS AND DISCUSSION

Personal characteristics of the respondents

These include age, sex, marital status, educational status and farming experience. Table 1 shows that majority (32.2%) of the respondents were between ages 50-59 years, while 26.6 were between the ages 40-49 years. From the distribution, it could be inferred that a simple majority of the sampled respondents are aged. This category shows that those ages range who would have been interested in technological change and creative are not many among the respondents and farming families at large. According to Taylor and Walker (1994), older people do not learn as quickly as their younger counterparts. They are hard to train, lack creativity, cannot adapt to new technological change and cannot do heavy physical work. All these attributes could affect their productivity level. Also, few percentages (24.6%) of the respondents were females. In most rural societies in Nigeria, the main source of farm labour is from the family. Thus, there is the belief that women are weak and cannot be exposed to heavy, physical work. According to Hellerstein and Neumark (1999), sex discrimination in labour markets may generate a wage gap between men and women that exceed any gap in marginal productivity. They further stated that, there is a statistically significant negative relationship between marginal productivity and the proportion of females. Table 1 reveals that majority (85.9%) of the respondents are married and still living together as a family, while 4.02 percent are divorced. In rural areas of Africa, the family is a respected institution; they make use of their family as their major source of farm labour. Family structure in most cases greatly affects the productivity level of that family. It is also indicated that substantial number (32.7%) of the respondents had no formal education, close to half (42.7%) had primary education, while 23.1 percent had secondary school education. In this modern day world, level of illiteracy is one of the strong determinants of farmers' productivity level. According to Mahmood and Sheikh (2005), most of the farmers in the rural areas are illiterate or with little education creating a large gap between agricultural technologies and its use, and resulting in continuous suffering in farming community due to low crop yield. Primary (level) education improves productivity of small farmers, the introduction of "packages" of technology through agricultural extension services is important for improving farm productivity. These packages are essentially combinations of practices and inputs tailored to specific crops and to land, water and climate conditions. Farmers need quality basic education to use these extension services (Tariq, 2005). The result as presented in Table 1 shows that 34.67% has more than 21 years of experience in farming. About 23.12% has between 16 and 20 years experience in farming. Only 9.5 percent of the respondents had less than 5 years farming experience. This results support the position that high productive industries are characterized by high general experience (Hannu *et al.*, 1999).

Farmers Attitudes towards RTEP

The result shown in Table 2 reveals a majority of the farmers (72.9%) agreed that root and tuber expansion programme has really helped them in terms of marketing their produce. Very few percentages (6.1%) disagreed that use of root and tuber expansion programme technologies ensures high level of food security for them and their families, 22.1 percent agreed that root and tuber expansion programme technologies are not timely for their farming activities, while 26.1 percent of the respondents were undecided about this statement. However, 44.2 percent agreed that there is low technical know-how of RTEP technologies among farmers and this is supported when almost all the farmers agreed that there is need for more training in the use of RTEP technologies. The results support the position that seminars, workshops, discussion or any other mode of communication can be sought according to situations for creating awareness regarding agricultural production technologies (Mahmood and Sheikh, 2005).

Perception of Respondents on benefits derived from RTEP

From the result shown in Table 3, majority of the farmers (62.8% and 34.2%) said they do not derive any benefits from biological control of pests and weed control respectively. However, 38.2 percent said that benefit derived is shown in increase in production level from RTEP technologies, 40.7 percent benefited sustainable increase in income and 44.2 percent derive high level of household food security.

Table 1: Distribution of Respondents' Personal Characteristics (n=199)

Age (yrs)	**Frequency**	**Percentages (%)**
Below 30	19	9.55
30-39	30	15.08
40-49	53	26.63
50-59	60	30.15
60 and above	37	18.59
Sex		
Male	150	75.4
Female	49	24.6
Marital status		
Single	10	5.03
Married	172	86.43
Divorced	8	4.02
Widowed	9	4.52
Educational status	**Frequency**	**Percentage (%)**
No formal education	65	32.66
Primary education	85	42.71
Secondary education	46	23.12
Tertiary education	3	1.51
Farming experience (years)	**Frequency**	**Percentage (%)**
5 and below	19	9.55
6 – 10	36	18.09
11 – 15	29	14.57
16 – 20	46	23.12
21 and above	69	34.67
Total	**199**	**100.00**

Table 2: Distribution of Respondents' Attitudes toward Root and Tuber Expansion Programme

	Attitudinal Statements	**Percentages of respondents**				
		SA	**A**	**U**	**D**	**SD**
1	Farmers can exploit market easily as a result of RTEP	13.6	72.9	6.5	-	7.0
2	Use of RTEP ensures high productivity level for farmers	19.6	71.4	3.5	5.0	0.5
3	RTEP are not timely for farming activities	0.5	21.6	26.1	49.7	2.1
4	Handling of equipment in RTEP is very dangerous	1.0	1.5.	10.6	72.4	14.6
5	Costs of RTEP do not encourage farmers	-	22.6	6.0	58.8	12.6
6	Use of RTEP are highly risky	-	1.5	7.0	71.9	19.6
7	My level of utilization of RTEP technologies are high	4.0	63.4	4.5	24.6	3.5
8	I have low technical know-how of RTEP technologies	2.5	44.2	0.5	37.6	15.2
9	RTEP technologies predisposes to diseases/sickness	4.0	2.0	6.5	62.3	25.2
10	More training is required for the use of RTEP technologies	12.0	75.0	5.5	6.0	1.5
11	Seasonality is a great problem for the use of RTEP technologies	3.5	66.3	13.1	15.1	2.0
12	RTEP technologies are not timely for farming activities	0.5	22.1	26.1	49.3	2.0
13	Use of RTEP technologies ensure high level of food security	19.6	68.3	3.5	6.1	2.5
		80.2	532.8	119.4	458.8	108.3

SA: Strongly Agreed, A: Agreed, U: Undecided, D: Disagreed, SD: Strongly Disagreed

Table 3: Distribution of respondents' perceived benefit derived from RTEP

Benefits	Percentage of all respondents		
	No benefit	Derived benefit sometimes	Derived benefit always
Rapid release of varieties of planting materials	34.7	46.7	18.6
Improved biological control of pests	62.8	24.6	12.6
Adequate weed control	34.2	27.6	38.2
Increase in production level	34.2	27.6	38.2
Sustainable increase in income	33.7	25.6	40.7
High level of household food security	35.7	20.1	44.2

Table 4 indicate that more than half (71.9%) of the respondents regarded credit facilities under RTEP as a serious constraint. It could also be inferred that almost all the farmers ticked that their form of constraints or the other hindering them from using or fully utilizing RTEP technologies; it thus shows that farmers are faced with constraints either serious or not serious in technology use. 74.4 percent said high cost equipment was not a serious constraint, 79.9 percent ticked farmers interest as a constraint but not serious. However, 11.6 percent of these farmers said that marketing of produce is a serious constraint in bridging the gap of what is produced and what is lost due to perished goods.

Table 4: Distribution of respondents' constraints to the use of RTEP technologies

Constraints	Percentage of all respondents		
	Not a constraint	Not a serious constraint	Serious constraint
Inadequate Credit facilities	4.5	23.6	71.9
Lack of Improved varieties	6.5	75.9	17.6
High cost of equipment	8.5	74.4	13.6
Organizational principles	36.7	49.7	13.6
Inappropriate Dissemination method	19.1	73.4	7.5
High cost or scarcity of Labour	9.0	70.4	20.6
Low Farmers' interest	16.6	79.9	3.5
Poor pricing/Marketing of farm produce	26.6	61.8	11.6

Table 5: Chi-square test of the relationship between some personal characteristics (sex) and productivity level

State	df	$\chi 2$	P value	Decision
Lagos	2	1.306	.521	NS
Ogun	2	21.335	.000	S

P>0.05 = NS (Not Significant) P<0.05 = S (Significant)

Table 6: Correlation for relationship between age, farming experience and productivity level

State	Variable	Df	R	P	Decision
Lagos	Age	91	-0.308	0.003	S
	Farming Experience	93	-0.121	0.245	NS
Ogun	Age	98	-0.040	.697	NS
	Farming Experience	95	.327	.001	S

P>0.05 = NS (Not Significant) P<0.05 = S (Significant)

Table 7: Correlation between use of RTEP technologies and productivity level

State	df	R	P	Decision
Lagos	99	.491	.000	S
Ogun	98	.575	.000	S

P>0.05 = NS (Not Significant) P<0.05 = S (Significant)

Testing of Hypothesis

Ho_1: Relationship between selected personal characteristics of farmers and their productivity level.
To test for this hypothesis, chi-square and Pearson Product Moment Correlation were used.

Chi-square analysis between sex and productivity level of Farmers

The result in Table 5 showed that there is no significant relationship between sex and productivity level of farmers in Lagos state (χ^2 = 1.306, P = 0.521), whereas there is significant relationship between that of farmers in Ogun state (X^2 = 21.335, P = 0.000). The hypothesis which states that there is no significant relationship between sex and productivity level is therefore accepted for farmers in Lagos state, but rejected for farmers in Ogun state.
This result can be attributed to the possibility of the farmers in Lagos State being more cosmopolite than the farmers in Ogun State, also the exposure to more media facilities by farmers in Lagos could be a factor for this result. The implication of this is that more efforts need to be put in place by the Agricultural Development Agency and Non-Governmental Organisations/Civil Societies Organisations to ensure equity in access to information by farmers.

Pearson Product Moment Correlation between sex and productivity level of Farmers

Table 6 shows that relationship between age and productivity of farmers from Lagos state was significant (r = -0.308, P = 0.003). This shows that there is significant but inverse relationship, as the age of the farmers increases; their productivity is decreases. The result further shows that there is no significant relationship between farming experience and productivity level of farmers in Lagos state (r = -0.0121, P = 0.245). This implies that their farming experience has no effect on productivity. However, for farmers in Ogun state, there was no significant relationship between their age and productivity level (r = 0.04, P = 0.0697). This suggests that age did not affect their productivity level. There was a positive significant relationship between their farming experience and productivity level(r = .327, P = 0.001) thus the hypothesis is rejected.

Ho_2: Relationship between the use of RTEP technologies and productivity level

Table 7 shows that use of RTEP technologies is positively correlated to farmers' productivity level both in Lagos (r = 0.491, P = 0.000) and Ogun state (r = 0.575, P = 0.000). This means that the use of RTEP technologies affect the productivity level. Hence, the null hypothesis that says there is no significant relationship between the use of technologies and productivity level was rejected.

Ho_3: Significant difference in the productivity level of farmers from Lagos and Ogun states.

Table 8 shows that there is significant difference in the productivity level of farmers in Lagos and Ogun states (t = 3.955, P = .000), thus the null hypothesis that says there is no significant difference in the productivity level is rejected. The mean of their productivity (Lagos = 61,014.108, Ogun = 130,655.21) further shows that farmers from Ogun state has higher productivity level than the farmers from Lagos state. However, farmers in Lagos State use RTEP technologies more than farmers in Ogun State. This further shows that the use of RTEP technologies has great effect on the productivity of farmers from Ogun State than Lagos State. This result supports the assertion by Mahmood and Sheikh (2005), that productivity can be increased by adopting recommended technologies.
This result further revealed that technologies are not limited to use, but using the recommended rate or specification. There are other various factors that could affect productivity aside recommended technologies; these are dissemination method, the strengthening of linkages between researches, extension and farmers have always been emphasized (Mahmood and Sheikh, 2005). For this to be achieved information exchange should be initiated at the levels of farmers.

Table 8: Test for difference in the productivity level of farmers from Lagos and Ogun states

Variable		Df	Mean square	F	P	Decision
Productivity	Between groups	1	2.4128E+11	15.644	.000	S
	Within groups	197	1542317139			
	Total	198				

P>0.05 = NS (NOT SIGNIFICANT) P<0.05 = S (SIGNIFICANT)

CONCLUSIONS AND RECOMMENDATION

Rural farming communities face a multitude of problems towards maximizing crop productivity. In spite of successful researches on new agricultural practices with respect to crop cultivation, majority of the farmers do not get near the upper-limit yield due to several reasons. One of the reasons is expert advice regarding crop cultivation which does not reaching farming community in a timely manner. Due to several reasons, such as the ratio of extension agent to farmers (1:300-2000), the current agricultural extension system is unable to deliver the advice to all the rural farming communities in a personalized manner. The traditional way of technology dissemination through the method of train the trainers is not meeting the expectation of the farmers due to lack of coverage, fund and lack of personalized advice. Despite agricultural knowledge availability, there are spatial and temporal constraints with respect to information dissemination, majority of the members of rural farming communities still produce using old methods. Also as most of the farmers have little or no education, there is a large gap between agricultural researches and its application, resulting in continuous suffering in the farming community due to low crop yield. There is also loss of crop yield to weeds, pests and diseases and other unfavourable growing conditions. There is a room to reduce all the negative effect of several factors that disturb the crop by providing timely expert information. On the basis of this study, the following recommendations are made to enhance adoption of technologies which ultimately leads in reducing the gap between actual and potential yield. The prime step towards adoption of any technology is awareness. Creation of awareness is very important; a well established extension system should be put in place for the dissemination of agricultural technologies. The strengthening of linkages between research and extension and farmer is very important. For strengthening effective links a proper information exchange forum should be initiated at lower level where farmers can participate with ease. All stakeholders interested in Agricultural development can be the members of the forum and they could participate freely. Many times recommended technologies delivered to farmers do not match with each other. It creates a state of confusion among farmers. To avoid such instances of confusions, all stakeholders generating and delivering production technologies are required to hold meeting for thorough discussion before preparing documents. The role of education has always been recognized for the adoption of technologies. Many studies and forums have emphasized to increase rural education and many projects and agencies are involved in uplifting literacy rate, but this are localized in nature leaving little effect on rural communities. A perspective planning is needed to target the real aim in increasing the literacy rate; these will help farmers to understand crop production technologies.

Implications of the finding to Agricultural Extension

The findings have assisted in disclosing some of the problems/constraints to the use of Root and Tuber Expansion Programme technologies; it will also assist the Agricultural Development Agencies both Governmental and Non-Governmental to know where the problem lies in the implementation of Root and Tuber Expansion Programme technologies. It will further help to reveal the relationship between personal characteristics and crop productivity and how the relationship could be strengthened.

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